Cap-and-Trade Program Scope and Point of Regulation

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What is "Scope" and "Point of Regulation"?

- **Scope of Coverage: What GHG emissions are included in the cap and trade program?**
  - What greenhouse gases?
  - What sectors?
  - What facilities? What types and thresholds?
  - What fuels?
  - Combustion emissions included? Process-related emissions?
  - Embodied emissions?
- **Point of Regulation: Who has the obligation to surrender allowances to match emissions?**
  - Upstream (where GHGs enter the economy, or close)
  - Downstream (where GHGs are emitted into the atmosphere)
  - Other (vehicle manufacturers, local distribution companies)
  - Hybrid (cover large sources downstream, address the rest of the economy at a different point of regulation or through other policy tools)

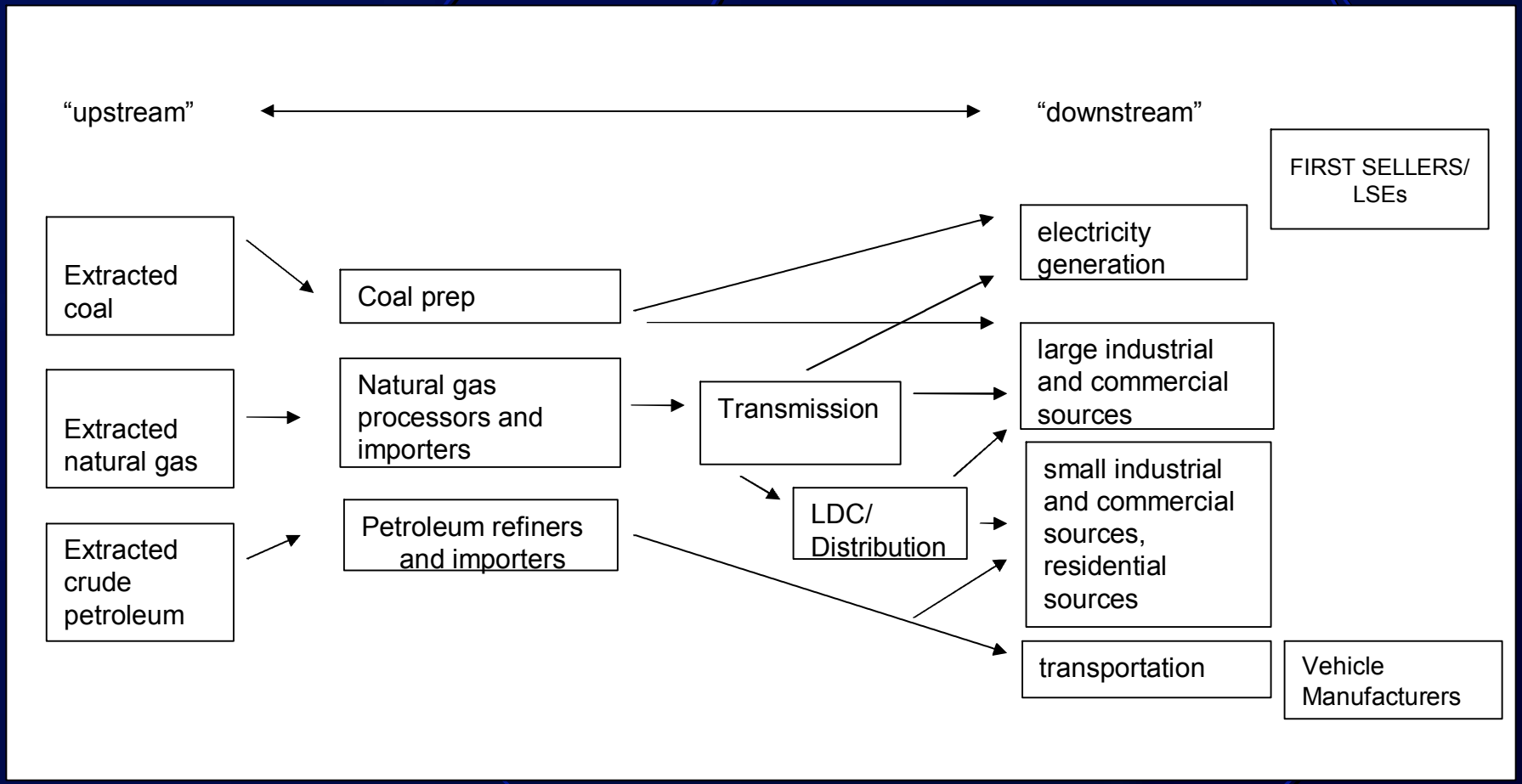
Key Considerations

- Maximize breadth of coverage taking into account administrative feasibility
- Integrity of emissions data
  - Availability of data before setting baseline key consideration
  - Ability to measure, monitor & report emissions data at the point of regulation
- Number of covered sources
  - Too large a number administratively complex
  - Too small a number threatens viability of emissions commodities market

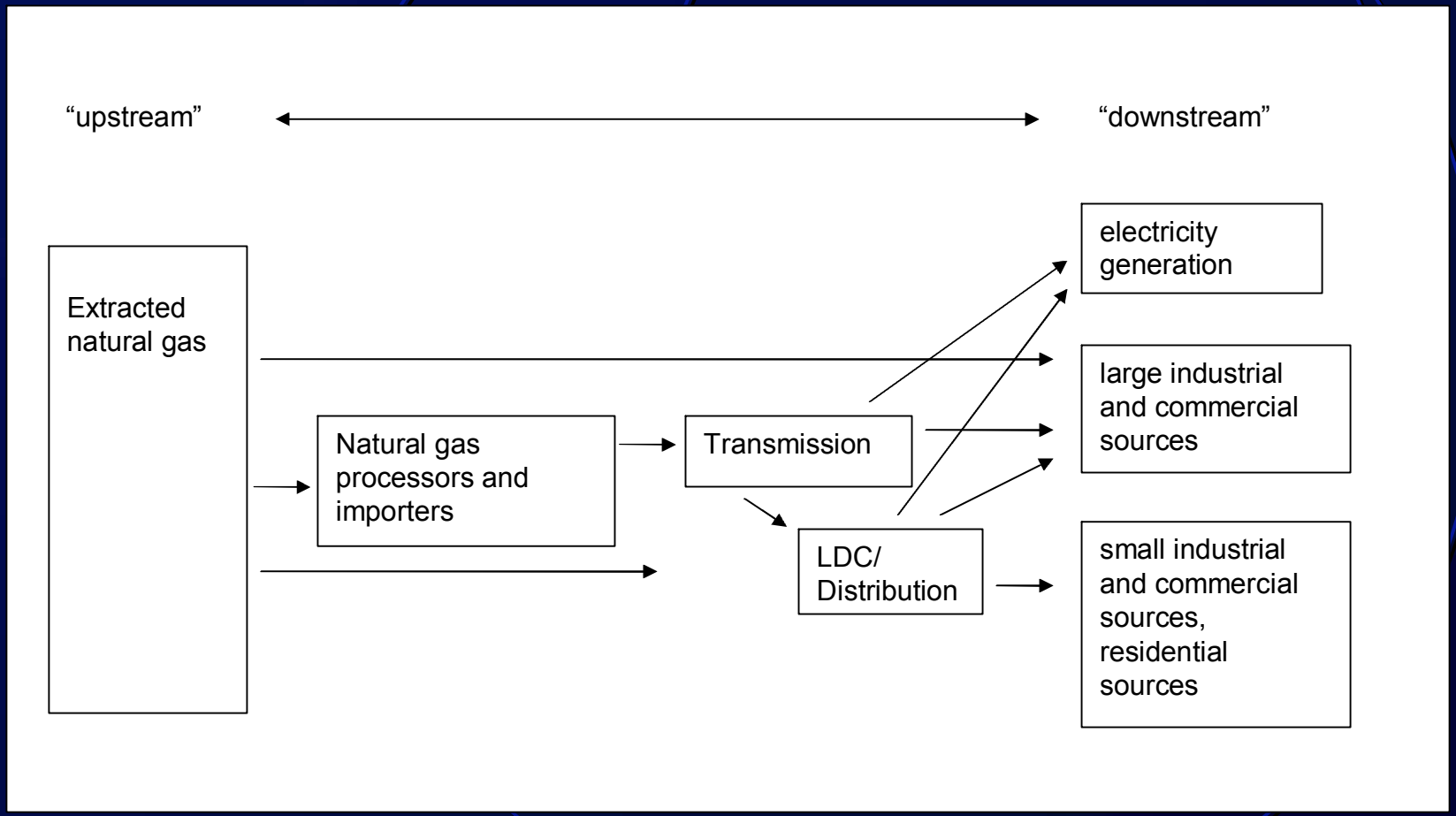
What are “Upstream” and “Downstream”?

- **Refers to position of greenhouse gases as they move through the economy from production or introduction into commerce, to emission into the atmosphere**
- **Downstream means at the point of emission**
- **Upstream:**
  - at choke points toward the upstream end of the spectrum (refiners, importers, natural gas processors, coal prep plants)
  - Most fuels move through these facilities
  - (generally not all the way upstream - coal mines doable, but not oil or gas wells -- too many)

Upstream/Downstream



Natural Gas


"upstream"
"downstream"
Extracted natural gas
Natural gas processors and importers
Transmission
LDC/ Distribution
electricity generation
large industrial and commercial sources
small industrial and commercial sources, residential sources

Why Upstream?

- Most comprehensive coverage at the smallest number of facilities
  - Greater coverage leads to lower costs
- Possibility of lower administrative costs
- View that response to price signal independent of point of regulation

Why Downstream?

- View that point of regulation does affect behavior; that emitters generally have more compliance options than fuel providers; and that it's appropriate for regulated entities to be the ones with options
- Most real-world experience is with downstream (acid rain, eastern NO_x program, EU ETS); or upstream where substitutes are available (CFCs, lead in gasoline)
- Facility-level data availability (already reported for electric power plants; protocols and data collection easily expandable to other large stationary combustors)
  - NJ GHG mandatory reporting example
- Automatically rewards CO_2 emissions-reducing technologies (CCS, etc.); not just technologies that reduce fuel C content
- Can phase in coverage over time

A Matter of Perspective

- Some tendency among energy folks to think in terms of carbon and fuels moving through the economy; some tendency among environmental folks to think in terms of CO_2e and emitters
- Some tendency among economists to think point of regulation doesn't affect behavior; some tendency among regulators and some businesses to think it does

Good News

- Hard to be a purist on this
- Although each side starts at one end of the spectrum, pragmatic considerations move you along the GHG chain
- On non - CO_2 gases, consensus emerging:
  - HFCs and SF_6 should be covered upstream
  - N_2O at nitric acid and adipic acid plants and PFCs at aluminum plants should be covered downstream
- On process CO_2 emissions, cover large sources downstream
- Seems to be convergence (at least in the Senate) on coal; EPW Committee bill covering coal downstream (1000 coal power plants vs. 1500 coal mines vs. 300 prep plants)

So the issues are…

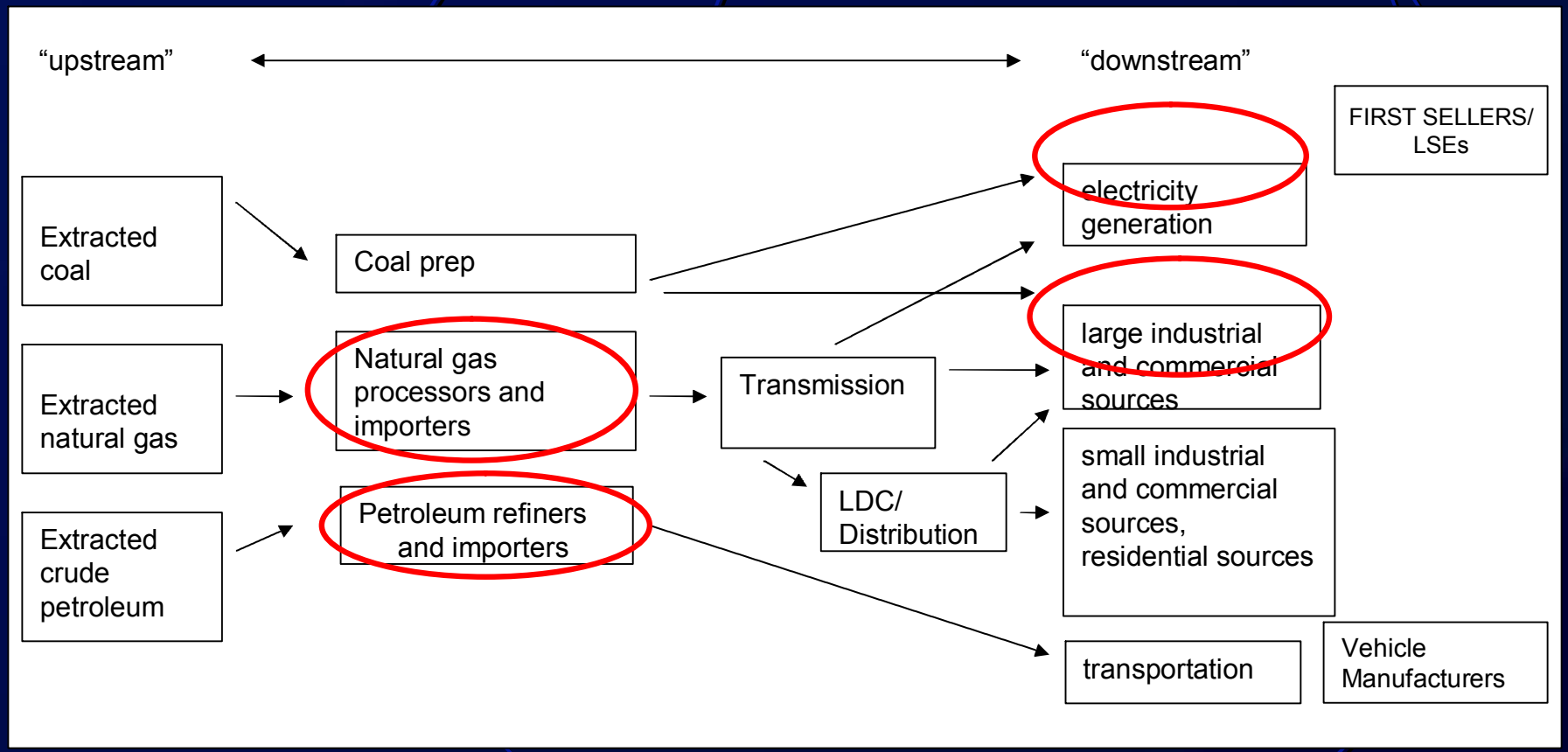
- Depending how you think about this:
  - Oil and gas
  - Buildings and transportation
  - Maybe some outstanding issues on non-CO_2 gases

Special Considerations for States

- Upstream a bit more problematic: upstream source may be out of state
- To do upstream at regional level requires covering imports into the region; this could be tricky as it may be difficult to distinguish fuels destined to be used in-region from out-of-region, and regional boundaries may keep changing as program expands
- Difficult to cover vehicle manufacturers at state/regional level
- For electricity at state level a key issue is how to deal with imports
  (e.g., first deliverer or load-based approach)

Hybrid #1:

Oil and gas upstream; coal downstream



Hybrid #1:

Cover Oil and Gas Upstream; Coal Downstream

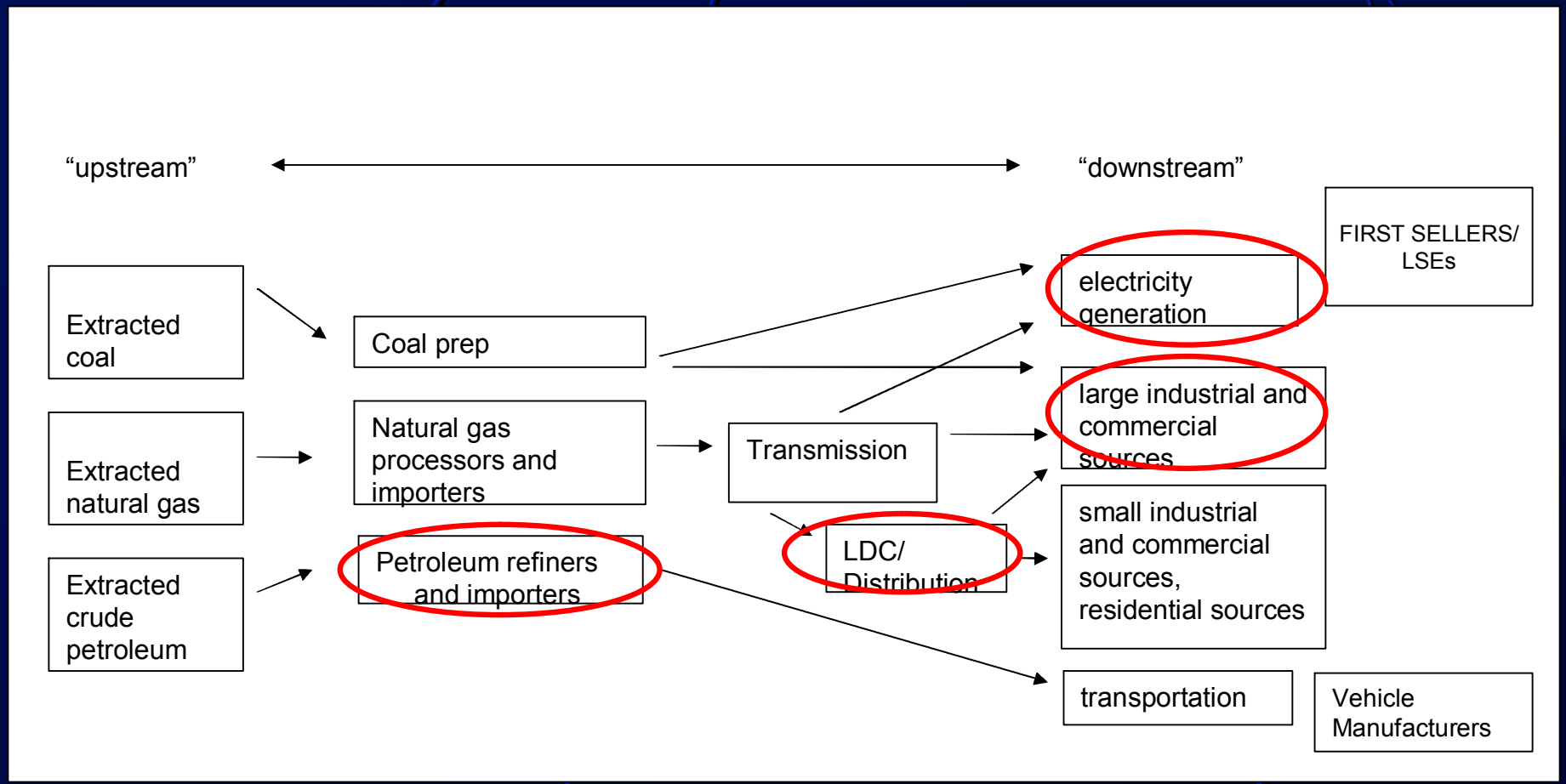
- Oil refiners and importers
- Natural gas processors and importers
- Considerations
  - sends price signal to consumers
  - for oil and coal, most comprehensive coverage at fewest sources
  - no compliance options for covered entities other than reduced sales (like a quota) or buying allowances and passing on the costs
  - incomplete coverage of natural gas; no facility-specific data on natural gas processors
  - concentration of ownership

Upstream Oil and Gas Data

- 150 refineries cover almost the whole sector
- Natural Gas:
  - 530 natural gas processing plants cover 78% of gas; importers bring it up to 86%
  - California Example: 120 natural gas processors, interstate pipelines and pipelines from Mexico cover most natural gas

Hybrid #2:

Large sources downstream; Gas LDCs; oil refiners



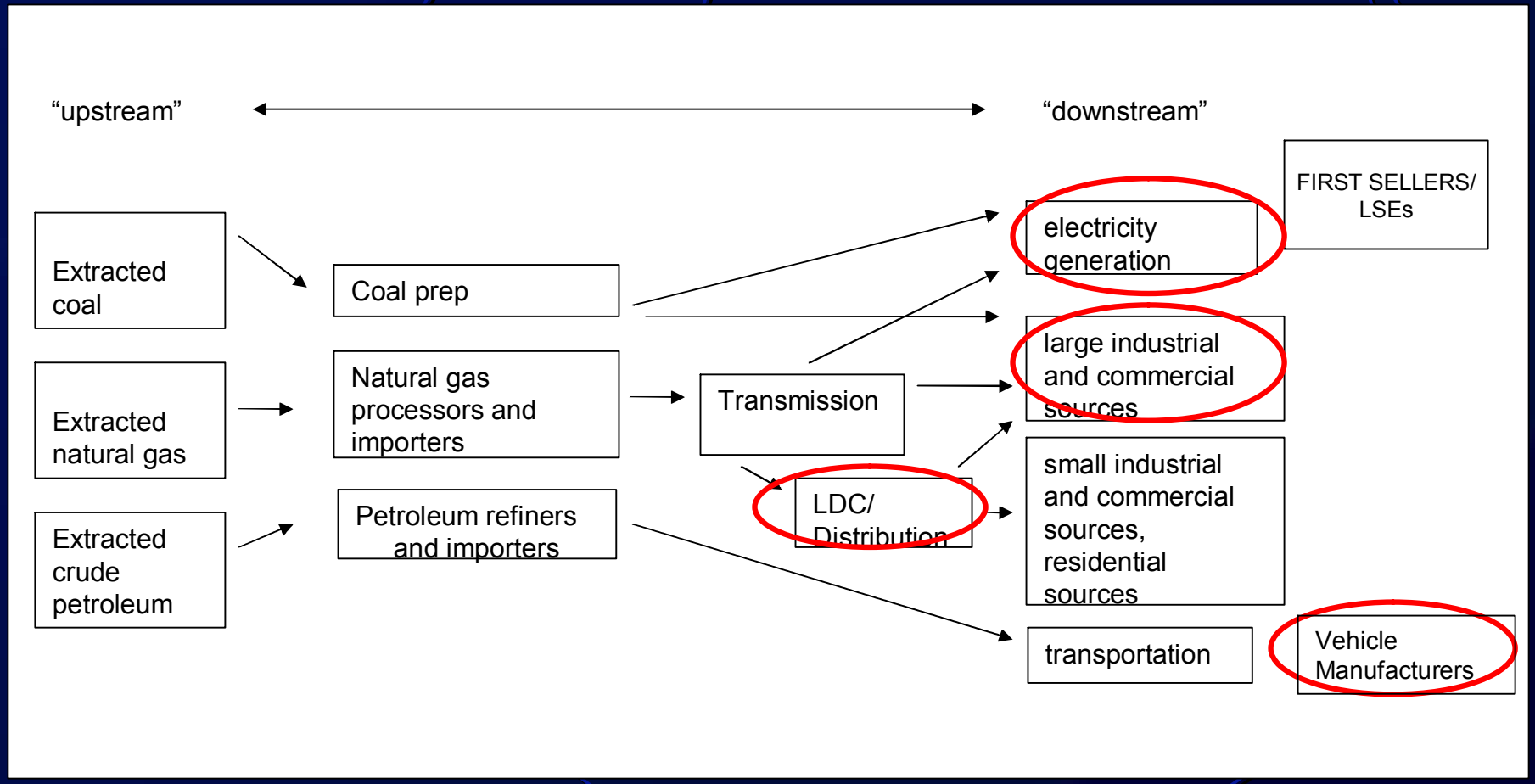
Hybrid #2:

Large sources downstream; Gas LDCs; oil refiners

- Cover natural gas, coal and oil combustion, process emissions (including non-CO_2 gases) at large sources
- Cover natural gas local distribution companies for residential and commercial gas use (buildings)
- Cover oil upstream (at refiners and importers; covers transportation and buildings)
- Considerations:
  - already collect data on electric power plants; easy to expand to large combustors
  - if coal combustors are covered, makes sense to cover natural gas combustors
  - combustors have efficiency and fuel switching options; also CCS
  - Need more exploration of LDCs:
    - they can implement efficiency programs, but decoupling important
    - accounting issues

Hybrid #3:

Large sources downstream; Gas LDCs; and vehicle manufacturers



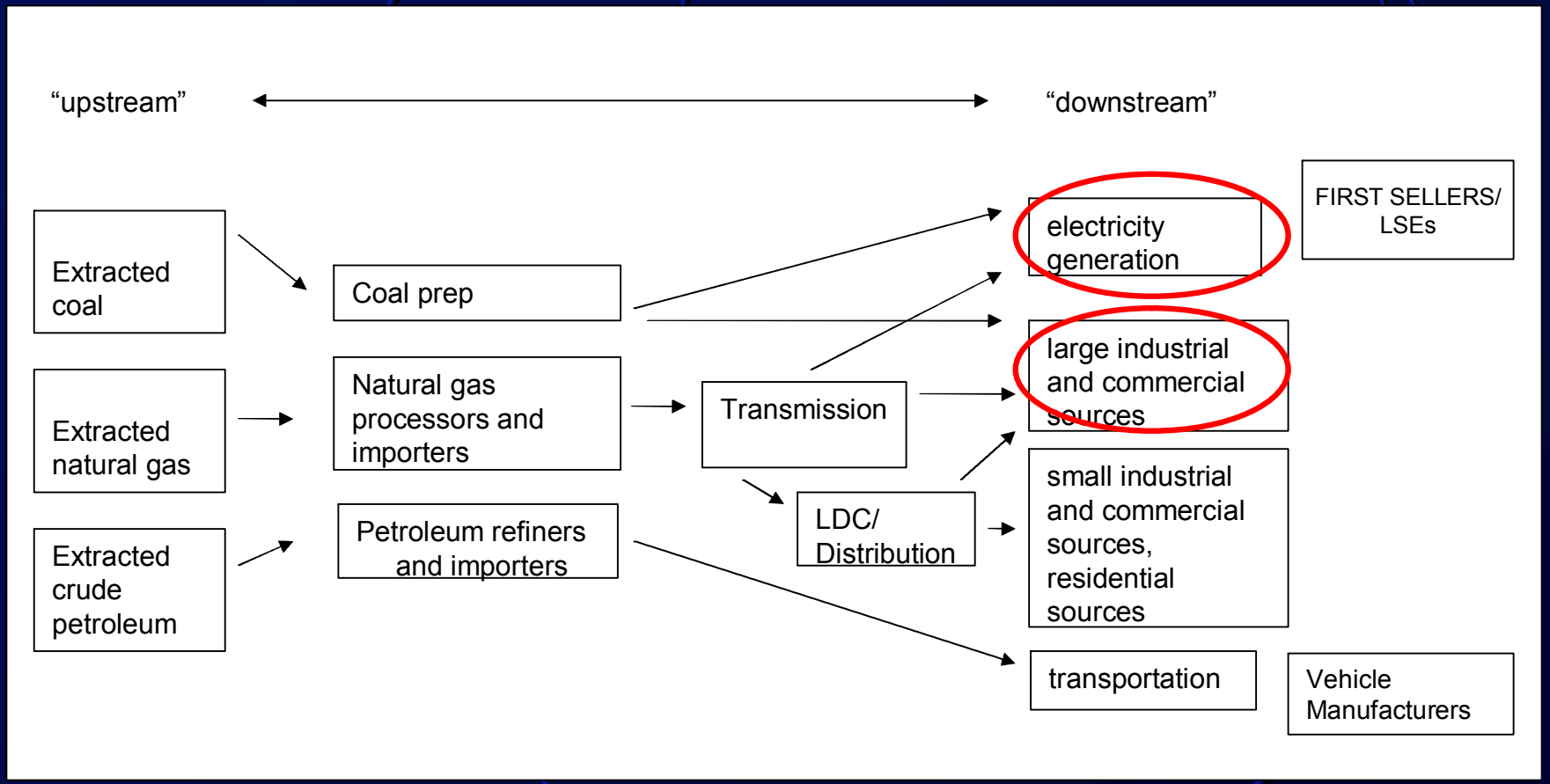
Hybrid #3:

Large sources downstream; Gas LDCs; vehicle manufacturers

- Cover large sources downstream (natural gas, coal and oil combustion, process emissions (including non-CO_2 gases)
- Buildings: Cover natural gas local distribution companies for residential and commercial gas use (home heating oil excluded)
- Transportation:
  - Cover vehicle manufacturers – make them responsible for the emissions of the vehicles they manufacture
  - Airlines?

Hybrid #4:

Large sources downstream; regulatory standards for transportation and buildings



Hybrid #4:

Large sources downstream; regulatory standards for transportation and buildings

- Cover large sources downstream (natural gas, coal and oil combustion, process emissions (including non-CO_2 gases)
- Cover transportation and buildings (vehicles and commercial and residential heating) through regulatory standards
- Considerations:
  - Standards generally considered less economically efficient
  - Successful experience with standards
  - Both standards and price signal may be necessary

Key Options for Transportation

- **Cover Oil Upstream**
  - Comprehensive
  - Sends price signal with every gallon used
  - Covered entities have limited compliance options
  - Consumers relatively unresponsive to gasoline price changes

Low-Carbon Fuel Standard

- Comprehensive
- Takes into account life-cycle GHG emissions
- Life cycle analysis is challenging
- Doesn't put a hard cap on emissions
- All things equal, not as economically efficient as cap and trade

Key Options for Transportation, cont'd

- **Cover vehicle manufacturers – hold allowances to match the emissions from the vehicles they sell:**
  - Lots of compliance options
  - Manufacturers are price-responsive
  - Similar to CAFE compliance
  - Manufacturers have no control over VMT
  - Emissions must be estimated; uncertainty
  - No fuel price incentive to discourage driving or motivate interest in efficiency
  - Initially coverage low but can cover growing percentage over time
- CAFE
- Vehicle GHG standards

Special Issue with Transportation

- Should it have a separate market or be part of broader market?
- All things equal, broader market more economically efficient
- If part of broader market, could bid up allowance price for total economy without achieving much additional reduction
- Rest of economy may not be able to reduce rapidly enough without resorting to very high CO_2 prices to drive demand reduction.
- May want GHG reductions in transportation sector for co-benefits (e.g., energy security, congestion)
- May need more than one tool to address transportation

Before There Were GHG Programs

- US Acid Rain Cap-and-Trade Program
  - Electric sector only
  - SO_2 Only
  - Obligation at the source of the emissions sources
- Northeast NOx Budget Program (Later EPA NOx SIP Call)
  - Electric and Industrial combustion sources
  - NO_x Only
  - Obligation at the source of the emissions sources

EU Emissions Trading Scheme (EU ETS)

- Multi-Sector Cap-and-Trade on Emissions Sources
- Covers CO_2 only
- Sectors:
  - Electricity generators
  - Other combustion installations (heat & steam production)
  - Mineral oil refineries
  - Iron and steel production and processing
  - Cement & lime
  - Glass & ceramics
  - Pulp & paper sector
- Role for offsets (CDM)

RGGI

Northeast Regional Greenhouse Gas Initiative (RGGI)

- Electric Sector Cap-and-Trade on Emissions Sources
- Covers CO_2 only
- Role for offsets
- Intend to add sectors over time, but no move as yet to expand beyond electric sector

Electricity Sector Cap-and-Trade Designs

- Load-based Design (OR, CA PUC)
  - Load-serving entities (LSEs) are required to hold allowances to cover emissions attributable to the power they deliver
- First Seller/Deliverer Approach (CA MAC)– applies to the first seller of electricity in the state, meaning:
  - Generators in the state (emissions sources) and
  - First sellers/deliverers in the state of electricity generated out of state (seller to LSEs).

Path Forward

- Consider decisions in existing programs
- Explore sector by sector, or fuel by fuel, or both
  - Identify and resolve data issues
  - Look at key transport options
  - Consider phase in of sectors over time
  - Additional work may be needed in natural gas
- Develop straw proposal(s) covering scope, point of regulation, and data gathering

Sector/Fuel?

Included?	Point of Regulation?	Feasible?	Data Available?
	At emissions source? At fuel source? Other?		

Questions?

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